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An Evaluation of Cesarean Section

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SUMMARY

The risks of cesarean section have been reduced in step with the increase in safety of all major surgical procedures.

In a series of 13,153 deliveries, 1,265 (9.6 per cent) were by cesarean section. There were three obstetrical maternal deaths in 11,888 cases in which delivery was by the vaginal route—0.025 per cent. In the series of 1,265 deliveries by cesarean section there was one death attributable to the operation —0.08 per cent.

The total uncorrected fetal loss following cesarean section was 3.8 per cent. This compares favorably with fetal loss of 3.2 per cent in the vaginal delivery group in this series, and with fetal loss rates reported from large obstetrical centers.

Anesthesia by spinal injection is the method of choice in cesarean section. There were no maternal deaths or accidents attributable to spinal anesthetic, and in no case was it felt that fetal death was attributable to it.

The incidence of maternal morbidity in the cesarean section group following spinal anesthesia was 15.8 per cent—less than half the incidence of morbidity following inhalation anesthesia.

THAT the employment of cesarean section has increased steadily in the past decade is evident from the published statistics of obstetrical services at various hospitals throughout the country. To justify this trend, the results obtained must be comparable to or better than those hitherto considered acceptable.

The present survey covers a series of 1,265 consecutive cesarean sections carried out on the obstetrical service of the Children's Hospital, San Franciso, between January 1, 1943, and December 31, 1948. As the total number of deliveries in that period was 13,153, the incidence of cesarean section was 9.6 per cent. These operations were done by 43 physicians, including resident staff members and 15 certified obstetricians. Ninety-five per cent of operations were on patients received in private practice. The incidence of various indications which led to cesarean section is shown in Table 1.

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Cephalopelvic Disproportion and Contracted Pelvis

Patients with absolute contraction of the pelvis or with obvious disproportion were delivered by elective cesarean section. Those with borderline contraction of the pelvis were as a rule permitted a trial of labor. It is in the group of patients with borderline contraction of the pelvis that there should be critical evaluation as to the advantages which abdominal delivery may have to offer. In prolonged difficult labor and difficult operative deliveries by the vaginal route, the incidence of fetal mortality and of maternal morbidity and trauma is high. Cesarean section offers the mother as much safety as

TABLE 1.—*Indications for Cesarean Section*

Indication	No. of Cases
Cephalopelvic disproportion	398
Previous cesarean section	392
Placenta previa and premature separation of placenta	85
Toxemia	77
Elderly primipara	76
Breech and other malpresentation	75
Uterine inertia	41
Pelvic tumors	23
Fetal indications	19
Previous stillbirths	15
Miscellaneous	64*

*Previous vaginal operation, 14; failure to deliver with forceps, 12; medical indication, 12 (diabetes, 6; rheumatic heart disease, 4; asthmatic state, 2); cervical dystocia, 11; previous myomectomy, 9; Rh-negative with titre, 6.

difficult mid-forceps delivery; and safety for the baby is considerably greater. Irving, in reporting on cesarean section in a ten-year period at Boston Lying-In Hospital, observed that mid-forceps delivery was as dangerous for the mother as cesarean section and eight times as dangerous for the infant. D'Esopo in 1950 reported from Sloane Hospital for Women, New York, that for the previous nine years it had been no more hazardous to the mother to deliver by cesarean section than by vaginal operation, low forceps excluded. With regard to the infant, D'Esopo observed that, with the increased employment of abdominal delivery and the resulting decrease in the incidence of mid-forceps delivery, there was a correlated decrease in the incidence of fetal birth trauma.

As to what constitutes a trial of labor, it is difficult to postulate any hard and fast rule. While the advent of effective antibacterial therapy has extended the time limits after onset of labor or after rupture of the membranes during which cesarean section may be performed with relative safety to the patient, such measures should not be counted upon to counteract the ill effects of poor clinical judgment. It is the authors' policy to try to evaluate, as early in labor as possible, not only the *possibility* of delivery by the vaginal route, but the *probability* that vaginal delivery can be accomplished with relatively little trauma to mother or infant. With rare exceptions the decision as to whether cesarean section is necessary can be made within 12 hours after the beginning of labor. Manahan and Eastman, in a study of 49 cases of pelvic contracture in which cesarean section was done after 30 hours of labor, reported that the cervix was completely dilated in only eight cases; in 29 cases dilation was less than 5 cm., and in 13 cases less than 3 cm. even after 30 hours of labor. These investigators noted that in cases in which vaginal delivery ultimately was accomplished, dilation of the cervix usually was complete or nearly complete within 12 hours of the onset of labor. It was further observed that in the presence of pelvic contracture if trial labor was extended beyond 30 hours, fetal mortality was more than 30 per cent.

Previous Cesarean Section

In the belief that repeat cesarean section is preferable to the risk of uterine rupture during labor, the authors carry out cesarean section delivery after approximately 39 weeks of pregnancy in any case in which there has been previous delivery by cesarean section.

Placenta Previa and Premature Separation of Placenta

These conditions cause a high maternal and infant mortality rate. Actual loss of blood and resulting shock cause many maternal deaths. The associated anoxia is a major factor in the fetal loss in these conditions. Also, prematurity of the baby contributes to the high rate. Delay in treatment must often be blamed for the aggravation of symptoms which may eventually lead to a condition from which the patient cannot be rescued.

While a general rule cannot be applied, it seems justifiable to state that in the presence of either of these conditions delivery should be carried out as expeditiously as is practicable, in the hope of preventing loss of blood and resulting shock in the mother and of giving to the baby the best possible chance of survival. In applying such a rule, vaginal delivery may be done advantageously only if the findings on examination show conditions favorable for easy and prompt termination, but cesarean section will frequently be the method of choice and, in the authors' opinion, will often give better results for both mother and baby.

Toxemia

In general, if a primipara with a firm uneffaced cervix is not responding to or controlled by medical regimen, the authors carry out cesarean section at the time judged most advantageous to the fetus and the mother.

TYPES OF OPERATION

In the series here reviewed, the low transverse cervical section was the type of operation employed in 1,206 (95 per cent) of the 1,265 (Table 2) cases. To the low cervical section the authors ascribe the following advantages over the classical section: (1) Lower incidence of uterine rupture in a subsequent pregnancy; (2) fewer postoperative complications; (3) less blood loss; (4) greater safety if infection should develop. In the occasional case in which utmost speed of delivery is necessary in the interest of either the mother or the baby, the classical cesarean section probably is the operation of choice.

TABLE 2.—*Types of Operation*

	No. of Cases
Low cervical cesarean	1,206
Cesarean hysterectomy	36
Classical cesarean	14
Extraperitoneal cesarean	9
Total	1,265

ANESTHESIA

In the six-year period covered in this study there was a shift away from anesthesia by inhalation (chiefly ether) and toward low spinal injection (Table 3). There were no maternal deaths due to the anesthetic agents, and in no case could fetal death be directly attributed to the spinal anesthetic agent. Every effort should be made to obtain the services of capable anesthetists in order to obtain the best results.

TABLE 3.—*Anesthesia for Cesarean Section*

Type	1943-44	1945-46	1947-48	Total
Spinal	20	111	441	572
Gas, oxygen, ether	217	233	34	484
Other inhalation	61	46	10	117
Local	15	13	12	40
Sodium pentothal	2	18	15	35
Caudal	0	4	13	17
				1,265

MORBIDITY

In considering postpartum morbidity, any patient with a temperature of 100.4° F. or more in any two 24-hour periods exclusive of the first 24 hours was classified as being in a morbid state. The incidence of morbidity in relation to the type of anesthesia and the type of operation is shown in Tables 4 and 5. It is noteworthy that the morbidity rate in the group given spinal anesthesia was 15.8 per cent—less than half that in the group anesthetized by inhalation. The incidence of morbidity was about the same with one type of cesarean section as with another. As a general rule, antibiotics were not given prophylactically.

TABLE 4.—*Maternal Morbidity in Relation to Type of Anesthesia*

	No. Patients	Morbidity (Per Cent)
Spinal	572	15.8
Gas, oxygen, ether	484	33.1
All other	209	35.9

TABLE 5.—*Maternal Morbidity in Relation to Type of Operation*

	No. Patients	Morbidity (Per Cent)
Low cervical section	1,206	25.7
Cesarean hysterectomy	36	22.2
Classical cesarean	14	21.4
Extraperitoneal cesarean	9	22.2

MATERNAL DEATHS

In the series of 1,265 cesarean deliveries there were five (0.39 per cent) maternal deaths (Table 6). However, in only one case (0.08 per cent) was death attributable directly to the operation. There were no deaths from hemorrhage or infection. In the 11,888 vaginal deliveries during the same period there were ten maternal deaths, but only three (0.025 per cent) were obstetrical.*

The fetal death rate (Table 7) in the cesarean section series compared favorably with the death rate in the vaginal delivery group. It also compared favorably with results reported from other large obstetrical centers (Table 8). Prematurity and atelectasis were the major causes of fetal death in the series of cesarean sections here reviewed. Practically all fetal deaths were attributable to the factor necessitating cesarean section, and not to the operation itself.

In general, the figures in Table 8 seem to imply that judicious use of cesarean section in a relatively larger per cent of cases lowers both maternal and fetal mortality rates.

D'Esopo,[1] in a recent evaluation of cesarean section, predicted that the "difficult, traumatic midforceps operations will be relegated to the obsolete procedures along with craniotomy, high forceps, versions, the bags, and bougies. The obstetrician will gradually reduce the incidence of vaginal operative deliveries by accepting a less rigid definition of cephalopelvic disproportion, by simply substituting the cesarean section for difficult vaginal deliveries when the occasion for such deliveries unpredictably

*The causes of death in the other seven cases were: transfusion reaction, miliary tuberculosis at three months, bulbar poliomyelitis, Landry's paralysis at three months, chronic pyelonephritis at six months, intestinal obstruction (volvulus) at three months, and spontaneous subarachnoid hemorrhage at seven months.

TABLE 6.—*Cases in Which Maternal Deaths Followed Cesarean Section*

Case	Age	Parity	History	Labor	Died	Cause of Death
1.	31 yr.	4	Essential hypertension Repeat preeclampsia	0	15 min.	Eclampsia Intracranial hemorrhage
2.	26 yr.	0	Moderate preeclampsia	0	3 hr.	Eclampsia Intracranial hemorrhage
3.	26 yr.	0	Moderate preeclampsia	0	48 hr.	Eclampsia Intracranial hemorrhage
4.	23 yr.	0	Not pertinent	0	30 hr.	Rupture of aneurysm, anterior communicating circle of Willis
5.	38 yr.	0	Not pertinent	10 hr.	28 days	Pulmonary embolism

Living baby in each case

TABLE 7.—*Fetal Mortality Rates Associated with Vaginal and Cesarean Section in a Series of 13,153 Deliveries*

	Vaginal		Cesarean	
	No.	Per Cent	No.	Per Cent
Deliveries	11,888		1,265	
Stillbirths	163	1.4	19	1.5
Neonatal deaths	216	1.8	29	2.3
Total fetal deaths	379	3.2	48	3.8

arises. Perhaps the best data to substantiate the value of such a policy is noted in the fact that cranial injuries at birth, as revealed by autopsy files at Sloane Hospital, New York, have been reduced to very nearly one per thousand births. The factors which make cesarean section so safe today make normal vaginal delivery even safer. Greater safety, especially to the mother, will always be inherent in the normal delivery, and for that reason we will never reach a stage in the development of the specialty when the cesarean rate may be permitted to rise with impunity." The authors agree with D'Esopo.

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TABLE 8.—*Cesarean Statistics Taken from Various Reports*

	Cesarean Sections	Cesarean Per Cent of Total Deliveries	Mortality Per Cent Cesarean Section	
			Maternal	Fetal
Dublin, Ireland (Collected) 1932-46	2,273	2.1	2.7	11.4
Evanston Hosp., Ill., 20,811 deliveries to 1948	856	4.1	0.93	8.2
Rochester, N. Y., (Collected) 1937-46	1,619	2.4	0.94	7.9
Boston Lying-In Clinic, 1934-43	1,094	3.2	1.4	7.8
Boston Lying-In (Private) 1934-43	793	6.7	1.1	5.5
Sloane Hospital, N. Y., 1941-48	1,000	5.8	0.1	3.7
Children'sHospital, San Francisco, 1943-48	1,265	9.6	0.39	3.8

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Discussion by DONALD W. DECARLE, M.D., *San Francisco*

It was Dr. J. C. Litzenberg who defined the conservative obstetrician as "the one who knows when to be radical." I hope I am not presumptuous in applying this qualifying definition to those of us whose results have been so well presented by Dr. Nanninga. I think there is little question that in the majority of private hospitals and even in many of the teaching institutions there has been a steady and justifiable increase in the percentage of abdominal cesarean sections during the past two decades. In my opinion, this increase has been the result of several factors. The majority of these have already been presented and discussed by the authors. Some I would like to further emphasize and others I would like to modify.

In the first place, there has been a gradual broadening of the indications for abdominal cesarean section. No one can deny that there has been a definite improvement in both fetal and maternal mortality in the presence of hemorrhage during the third trimester. Increased safety in transfusion technique, admittedly has been the chief factor. However, the swing toward abdominal delivery, especially in the presence of proven placenta previa, has also been a definite contribution. Secondly, there has been an increasing tendency toward surgical interference to salvage babies showing signs of intrauterine embarrassment, with justifying results. Thus, fetal distress is now considered by many to be a definite indication for cesarean section.

Next, the authors have shown the improved results in the presence of potential infection, making trial labor a safe procedure. The improvement may correctly be attributed to antibiotics, and to the improved technique of cesarean section, especially the low cervical and the extraperitoneal types of procedure.

Lastly, I am in entire agreement with the authors in their views on mid-forceps procedures, with one exception. It is common knowledge that the number of mid-forceps maneuvers increases in proportion to the number of cases in which caudal anesthesia is employed. However, with the increased relaxation obtained by this form of anesthesia, mid-forceps procedures are not the hazard that they were, and still are, in cases in which the patient is under general anesthesia.

By way of modification rather than criticism, I would like to further clarify our attitude in the handling of the elderly primipara. The age alone should never be considered the criterion for abdominal delivery. However, in general, if one or more indications, whether definite or questionable, are found in a primipara 35 years of age or over, it is our feeling that abdominal cesarean section is entirely justifiable.

I wish to say a word in favor of low spinal anesthesia in cesarean section. It is a procedure which has been severely condemned in the past as definitely dangerous to both mother and infant. In our experience during the past four years, this procedure has been employed almost exclusively. With the Pfannesteil type of abdominal incision which we use for cesarean section, one half the anesthetic agent previously employed is sufficient. Skin anesthesia midway to or at the umbilicus is all that is necessary for complete pain relief, thus considerably increasing the margin of safety for the mother.